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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/801,655	03/09/2001	Stephen Buchwalter	YOR920000330US1	3955

7590 03/13/2002

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EXAMINER

THAI, LUAN C

ART UNIT	PAPER NUMBER
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2827

DATE MAILED: 03/13/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/801,655

Applicant(s)

BUCHWALTER ET AL.

Examiner

Luan Thai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) 16-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 28-35 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5. 6) ☐ Other: _____

DETAILED ACTION

Election/Restriction

1. Applicant's election of Group I, claims 1-15 and 28-35 in Paper No. 7 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims **10-11** and **28-35** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim **11 and 28**, the word "weight" is unclear as to whether it implies "atomic weight" or "molecular weight".

In claim **10**, the limitation "the thixotropic agent" has no antecedent basis.

Claims **29-35** are rejected since it includes the limitations of independent claim

28.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-5, 8, 10, 12, and 13, insofar as in compliance with 35 USC 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Higgins (5,468,995) in combination with Ardakani et al. (5,512,613 of record).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 1-5, 8, 10, and 13, Higgins (specifically see figures 1 and 6) a packaging structure comprising a semiconductor device 22 (22') bonded to a chip carrier 12 (12') with an adhesive 24 (44), wherein the semiconductor is electrically connected to the chip carrier (12) with wire-bonds 26 (see figure 1) or the semiconductor device is a flip chip electrically connected to chip carrier 12' with solder ball 42 (see figure 6). Higgins fails to teach the adhesive comprising a cured reaction product from a diepoxide and cyclic anhydride wherein the epoxy groups are connected through an acyclic acetal moiety; and a thermally conductive filler.

Ardakani et al. teach Cycloaliphatic epoxides, which are reworkable and are a class of epoxy resins, comprising a cured reaction product from a diepoxide and cyclic anhydride wherein the epoxy groups are connected through an acyclic

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acetal moiety, wherein the diepoxide is acetaldehyde bis-(3,4-epoxycyclohexylmethyl) acetal (Col. 6, lines 14+); a thermally conductive filler such as alumina, silica (e.g., thixotropic agent), zinc oxide, etc. (Col. 6, lines 52+). The diepoxides above are of great importance for a number of diverse applications including coatings, structural components, adhesives, encapsulants, etc. (Col. 1, lines 10-25). It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the adhesives as taught by Ardakani et al. to Higgins' structure device in order to have the adhesive to be removed for repair, replacement, recovery, etc. (Col. 1, lines 17+).

Regarding claim 12, since the adhesive in the proposed structure device of Ardakani et al. (discussed above) and that of applicant claimed are similar, it would be obvious for the adhesive of the proposed structure device of Ardakani et al. to include the characteristic of providing a void-free bond.

5. Claims 6-7 and 9, insofar as in compliance with 35 USC 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Higgins (5,468,995) in combination with Ardakani et al. (5,512,613 of record) and further in view of Takigawa et al. (5,844,309).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 6-7 and 9, the proposed device of Higgins and Ardakani et al. discloses all the limitations of the claimed invention as detailed above with the exception of the filler being selected from the group consisting of aluminum

nitride, silver flake, and silica-coated aluminum nitride (regarding claims 6-7) or the filler being electrically conductive (regarding claim 9).

Takigawa et al. while related to a similar adhesive composition design teach the filler, added to an adhesive, including: insulating fillers such as silica, aluminum nitride, alumina, boron itride, etc. and conductive powers made of silver, gold, copper, aluminum, etc. (Col. 30, lines 4+). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use aluminum nitride filler or electrically conductive fillers as taught by Takigawa et al. added to the adhesive composition of the proposed device of Higgins and Ardakani et al. since such application is conventional in semiconductor art.

6. Claims 14-15, insofar as in compliance with 35 USC 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Higgins (5,468,995) in combination with Ardakani et al. (5,512,613 of record) and further in view of Call et al. (5,471,027).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 14-15, the proposed device of Higgins and Ardakani et al. discloses all the limitations of the claimed invention including an under fill encapsulant 44 (see Higgins' figure 6), as detailed above, with the exception of a heat spreader being bonded to the semiconductor device.

Call et al. (see figures 1-2 and 4-6) while related to a similar flip chip bonding design teach a heat spreader (10-70-170) being bonded to a flip chip

(20) for dissipating heat generated from the semiconductor device. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply Call et al.'s teachings of heat spreader to the proposed device of Higgins and Ardakani et al. for dissipating heat generated from the semiconductor device.

7. The following reference(s) is/are cited as of interest to this application:


U.S. Pat. No. 6,214,460 to Bluem et al. (Col. 8, lines 65-66) is/are cited for teaching silica is a thixotropic agent.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan Thai whose telephone number is (703) 308-1211. The examiner can normally be reached on 7:00 AM - 3:00 PM.

~~If attempts to reach the examiner by telephone are unsuccessful, the examiner's~~
supervisor, David L. Talbott can be reached on (703) 305-9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Luan Thai
March 7, 2002


DAVID L. TALBOTT
PRIMARY EXAMINER
ART UNIT ~~355~~
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